

The Novelty of Collaboration: High School Students Learning and Enjoyment Perceptions When Playing Cooperative Modern Board Games

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Abstract: Modern board games are changing the way people play analogue face-to-face multiplayer games. One of the novelties of this trend is the growing prevalence of games that offer collaborative gameplay. These cooperative games have been instrumental in shifting the demographic of players, attracting individuals who prefer engaging in constructive interactions rather than destructive confrontations. Likewise, playing cooperative games demand specific players' skills which can be associated with the concept of soft skills. Training these skills through modern cooperative board games, whether by modifying existing games or developing new ones as serious games or using gamification approaches, holds promising potential. To test the perception of students playing cooperative modern board games for the first time, we organized a one-day play session in a school environment, specifically in a classroom with the support of the students' teachers. Over a period of six hours (three in the morning and three in the afternoon), a total of 25 high school students from the vocational multimedia area, comprising students of all genders, participated in the session. The students engaged in gameplay with a curated selection of four cooperative modern board games. The results indicate that the students enjoyed the game sessions and recognized the significance of collaboration, as well as the associated skills including communication, empathy, organization, focus, and complementary interactions. The experiment reinforces the suggestion that the used modern board games could be introduced during classes as engaging activities fit for learning and training.

Keywords: Game-Based Learning, Board games, Cooperation, Collaboration, Education

1. Introduction

In today's digital age, young people are exposed to a variety of digital devices and online platforms that enable communication and social interaction. While these technological advancements have undoubtedly brought numerous benefits, there is a growing concern that they may be detrimental to young people's social skills, emotional development, and ability to form meaningful relationships. Therefore, endowing more collaboration, empathy, and face-to-face interactions in human relations, can be crucial for the holistic development of young people.

The case study presented in this paper aimed to investigate the potential of modern cooperative board games as a tool for developing soft skills in high school students, with a particular focus on collaboration. The study was conducted in a school environment, with 25 high school students from a vocational multimedia course. The selected games for the study were Team 3, The Mind, Rail Pass, and Magic Maze, chosen considering their cooperative nature, aligned with their accessibility for new players. The research focused on the students' perception of playing these games for the first time, their assessment of the level of collaboration, communication, difficulty, frustration, and enjoyment, and learning achievements from the gameplay. The study aimed to achieve a better understanding of the potential of these games as engaging activities for learning and training, and how they could be introduced in the classroom to enhance students' soft skills for work activities, namely collaboration, communication and expression during creativity and empathy collective tasks.

2. The Importance of Collaboration for Human Development

In the book "Moves in Mind: The Psychology of Board Games", Gobet et al. (2004) established parallels between the collaborative and cooperative processes that are triggered through board games and several concepts of developmental psychology, namely Piagetian theory. Piaget believed that children progress through four stages of cognitive development, with each stage building upon the previous one. In the first two stages (sensorimotor and preoperational), children's understanding of the world is primarily based on their own experiences. However, as they move into the concrete operational and formal operational stages, children begin to develop the ability to understand and think about abstract concepts, which requires collaboration and cooperation with others. In this view, collaboration and cooperation are particularly important in the development of social

understanding and moral reasoning (Vaish and Tomasello, 2013). This premise emphasizes the particular importance of decentration in board game psychology (Gobet et al., 2004). Decentration is a key concept in Piagetian theory that involves the ability to move beyond egocentrism and take into account the perspectives and actions of others (Kesseling and Müller, 2011). In the context of board games, decentration is critical to success (Gobet et al., 2004), as players must be able to consider the moves and strategies of their opponents and anticipate their actions.

As we can see, collaboration and cooperation are fundamental skills for human beings and play a crucial role in many aspects of our lives. Studies have shown that children prefer collaborative over individual food acquisition, indicating that motivation might be a key factor in the evolution of human-like cooperation (Rekers et al., 2011). Collaborative problem-solving (CPS) is a complex construct that involves both social and cognitive dimensions. The social dimensions of CPS include maintaining communication, sharing information, establishing shared understanding, and negotiating. The cognitive dimensions, on the other hand, include exploring and understanding, representing and formulating, planning, executing, and monitoring (Andrews-Todd and Forsyth, 2020). These skills are crucial in many fields, including education (Cimatti, 2016), business (Mitchell et al., 2010), and healthcare (Hariti et al., 2020).

Notwithstanding, Board games can help to support these relevant collaborative skills. Many games use specific game elements, like strategy and randomness, to simulate real-life experiences, that will favour the learning of these skills during the gameplay. Due to their particular characteristics, board games provide unique elements such as interaction among players, time invested in reading and interpreting rules between peers, which can help players to develop their collaborative and cooperative skills (Booth, 2021).

Through its international survey of board game players, Booth (2021) also demonstrated that "cooperation" appears as one of the favourite game mechanics, only surpassed by "worker placement". Cooperative games were also one of the favourite gaming styles of the 814 respondents, highlighting the relevance of exploring both collaboration and cooperation in the context of analogue gaming. Generating new forms of player interaction, without the need for aggressive conflicts and player elimination, are some of the traits of Eurogames (board games) (Woods, 2012). These Eurogames influenced the state of the art of board game design, where cooperative games thrive. Despite this potential, research regarding modern board games as game-based tools is still scarce (Sousa et al., 2023).

3. Collaborative Games and the Specific Case of Modern Board Game

3.1 3.1. Game Design Features to Deliver Collaborative Games

In the case of board games, cooperation is always present, even in competitive games. In multiplayer board games, explaining and following the rules constitute a form of collaboration among players (Rogerson et al., 2018). These analogue games lack automation systems to enforce the rules and the general gameplay (Zagal et al., 2006). The components serve as a medium for collaboration and require players to collaborate, as their disposal is how players interact with the game and with each other (Rogerson et al., 2016). Failing to fulfil these tasks can disrupt the game. Some players even express enjoyment in engaging with these bookkeeping tasks and interactions (Xu et al., 2011).

Some research has been conducted on the requirements and dimensions necessary to develop cooperative games. Seif El-Nasr et al. (2010) built up upon the work of Rocha et al. (2008). In addition to the need to introduce "Synergies between abilities", "Abilities that can only be used on another player", "Shared goals", "Synergies between goals", and "Special rules" (Rocha et al., 2008). Seif El-Nasr et al. (2010) add in their Cooperative Performance Metrics (CPMs) "Camera Setting", "Interacting with the same object", "Shared Characters", "Special characters targeting lone wolf", "Vocalization" and "Limited resources". Some of these dimensions, such as camera settings, are specific to video games, while the emphasis on characters may not be as relevant in board games, as they often tend to abstract these types of entities (Pulsipher, 2012).

Seeking authors who focus more on the analogue dimensions can highlight how board games differ from other media. Zagal et al. (2006) defined four lessons regarding cooperative analogue games, highlighting the need to: have tension between individual utility and team utility; allow players to make decisions without the consent of the team; demonstrate the payoff of their decisions; and demand that players can use their special powers and abilities as ways to make a difference and assist the team. These lessons aim to address generic problems of cooperative games, like the disengagement of losing personal agency, being indifferent to the game outcomes and being controlled by an alpha player. The alpha player can be a form of emotional inaccessibility (Heron et al., 2018) because this indirectly excludes the other players from the game. Duarte et al. (2015) directly

addressed these problems and sought to identify distinct features of games that generate cooperative experiences, whether it be teams competing with each other or. These distinctive features focus on team dynamics and highlight the game's defeat condition, as players can lose as a team against other players or collectively against the game system. Additionally, the authors emphasize the importance of information, including how the game state is presented to the players and how the player can communicate. The focus on information was recognized by Sfikas and Liapis (2020) when they tried to implement an IA agent to play Pandemic (2010), discovering that there was a need to create a way to visualize the information and the communication between humans and non-humans in the game to foster collaboration. Yuan et al. (2021) identified similar requirements for playing board games in online environments, highlighting the need for additional methods to compensate for the lack of communication through informal channels. Social behaviour, physical and other indirect communication need new channels for these games to be played online. Later, Zagal (2020) updated his lessons and pitfalls regarding collaborative games, highlighting the need to control information (private and collective). Zagal also argues that trust is crucial in a collaborative game because it is necessary for optimal play from both a teamwork perspective and the individual taskwork associated with players' individual actions.

We propose to select modern board games with the previous features. Playing them with students as ways to deliver collaborative experiences, evaluating if the students can identify the generic requirements for collaboration. In this way, we aim to test whether these games could be included in the school curriculum as tools for learning about collaboration, exploring their advantages, disadvantages, and potential pitfalls, all while fostering the development of new skills.

3.2 The Evolution of Modern Collaborative Board Games

Despite the declared collaborative characteristics of analogue games, fully cooperative games are becoming increasingly popular. Board Game Geek (BGG) identify the first cooperative game as 50 Card Games for Children (1933). After this game, BGG identifies 10.060 other games and expansions associated with the category of Cooperative Game. Considering only the games for 2023 and beyond, 650 new games fit into this category. As Zagal (2020) states, some popular games delivered collaborative experiences before, but The Lord of The Rings (2000) by Reiner Knizia was the game that proved that cooperatives could be successful. This game won the Spiel des Jahres in 2001 and inspired Pandemic (2008), one of the most popular cooperative board games ever made.

The variety of modern cooperative board games is vast. There are games of all types, themes, complexity, duration and cost. Games both for children and adults. Two cooperative games have achieved the top 1 of best games at BGG. Pandemic Legacy: Season 1 (2015) was number 1 between 2016 and 2017, while Gloomhaven (2017) dominated from 2017 to 2023. These are two examples of complex games, usually played by hobbyist adult players, as BGG tends to exhibit bias and favour high scores for such games.(Samarasinghe et al., 2021). However, several other popular games have achieved notable success. For instance, Hanabi (2010), Just One (2018), and The Crew (2019), won the prestigious Spiel des Jahres prizes. The Mind (2018) was also one of three nominees for 2018. Additionally, games like Sleeping Gods (2021) ranked high on the lists of acclaimed board game connoisseurs and influencers of 2021.

The variety is immense. We argue that these cooperative, or fully collaborative games expand upon the characteristics of Eurogames. In a simplified approach, Eurogames flourished in Germany from the 1980s to 1990s, characterized by controlling the conflict between players and avoiding player elimination (Woods, 2012). Eurogames enhanced the design elements of the contemporary cooperative game. As Eurogames became popular and their design features spread worldwide, new collaborative interactions emerged in games.

3.3 Characteristic of Cooperative Modern Board Games to Learn About Collaboration

Based on the requirements mentioned in the previous subsections, it is possible to find games classified as "Cooperative games" among the top BGG games that can be utilized in a school environment, such as a classroom. Previous experiences proved that the games must be simple and fast to play, requiring less effort from teachers and facilitators to teach the rules and allow students to play more than once to fully explore the game (Sato and Haan, 2016; Sousa, 2020, 2021). This is why it is recommended for a class from one to two hours to play games that do not exceed 30 minutes and with complexity below 2.00 (according to BGG, range from 1 to 5). According to player profiles and preferences, For higher engagement, it is recommended to select games that offer experiences capable of captivating players who enjoy problem-solving, exploring narratives, and the opportunity to create and build new and imaginative elements during gameplay. (Martinho and Sousa, 2023;

Zagalo, 2020). For practical reasons, each game should allow 4 to 8 players, which demands fewer facilitators to teach and collect data, and fewer copies of the same game (Sousa and Dias, 2020; Sousa, 2021).

4. Methodology

4.1 Sessions and Data Collection

The sessions occurred during a morning and an afternoon day. The students were divided into groups of 4 to 6 players. We established a dedicated table per game with an assigned facilitator responsible for teaching the game, addressing doubts during the gameplay, taking notes and asking questions after the play sessions. The facilitator had a form to guide them. The form (A4 sheet of paper) was divided into five sections.

1. Section 1: General notes.
2. Section 2: A table with a Likert scale from 1 to 5 for the players to classify (simultaneously with their fingers) the following game levels: Collaboration; Communication; Difficulty; Frustration; Fun.
3. Section 3: question "What did you enjoy more about the game?".
4. Section 4: question "What did you enjoy the least in the game?".
5. Section 5: question "Did you learn anything by playing the game?".

The questions from sections 3 to 5 were set to generate discussion and allow the facilitator to establish a debriefing process with the players, conducting them to reflect on the purposes of playing the games. During debriefing, players should have the autonomy to reflect, discuss and create significance for the activity (Sousa, 2021; Crookall, 2006).

After playing and debriefings, the students rotated tables and played different games. This process allowed every student to play all the games several times, while also providing an opportunity for the facilitator to practice conducting the games.

4.2 Game Selection

To maximize the number of different games as possible during a six-hour session involving 25 students, and to allow for repeated plays to enhance play efficiency, we selected games with low complexity and fast gameplay. This choice was primarily driven by the need for students to quickly grasp the rules before engaging in gameplay.

Table 1: Characteristics of the selected games

Game	Complexity	Duration	Number of players	Core collaboration dynamic
Hanabi	1.69	25	2-5	Players see their teammates' cards but not theirs. Players can give clues to teammates for them to play cards in a sequence.
Magic Maze	1.77	15	1-8	Players can move pawns in one direction or do specific tasks. The pawns must travel through the maze, requiring all players to move them.
Rail Pass	2.00	10	2-6	Players handle trains with cubes, passing them to get the cubes of their colour to their train station. During the game, players will have more trains than hands and places to pack them.
Team 3	1.10	30	3-6	A team of 3 players communicate to build a pattern with Tetris pieces. Sound and vision communication is limited.
The Mind	1.08	20	2-4	Players play cards in a collective crescent sequence without knowing what the other players' cards are. Communication is forbidden.

While the selected games may have reduced complexity compared to the top-rated BGG games, they still offer ample challenges for the players. They demand collaboration, and all players win or lose together. All games have design elements that constrain the alpha player effect, mostly due to the way the games deal with information (Duarte et al., 2015). Communication is limited or hidden in some way. In Rail Pass, communication is indirectly limited because there is not enough time for a simple player to process all the information due to the time limit and the need to deal with the train operation at the rail station. This complexity and game state changes serve as methods to conceal information. Because we are dealing with analogue games, the use of the

game's physicality is important (Rogerson et al., 2016). Even in games like The Mind, which involve minimal physical actions, players need to use their arms to signal pauses and utilize help cards, requiring motor coordination among players. Almost every selected game is played in real-time, adding tension to the gameplay and preventing perfect planning. While players can strategize, they must trust their teammates' taskwork like Zagal (2020) recommended. Games like Hanabi, Team3 and The Mind do not have this dimension. However, it is easily introduced as a modding approach to adapt the game (Sousa, 2021). In our case, we defined a limit of time which guaranteed that all the students could play all the games several times. Considering also the recommendation from Duarte et al. (2015), we introduced loss conditions to Rail Pass, meaning that scoring below a predetermined value was considered a failure.

Table 2: Identifying the characteristics of the game according to the game design features recommended for collaborative games

Game	Information		Challenge and tension		
	Communication limits	Hidden information	Physical constraints	Real-time	Lose conditions
Hanabi	1	1	1	*	1
Magic Maze	1	1	1	1	1
Rail Pass	*	*	1	1	*
Team3	1	1	1	*	1
The Mind	1	1	*	*	1

*Indirect relationships or game adaptation

5. Results and Discussion

5.1 Quantitative Data

For the purposes of statistical analysis, each player's participation in a game session was counted, with a total of 113 participations, spread across the 23 sessions. Hanabi was the most played game, being played by 29 different people, followed by Magic Maze ($N = 26$); Team3 ($N = 25$); The Mind ($N = 23$); and Rail Pass ($N = 10$).

Considering players' self-perception, the data obtained indicated that the level of fun was the most prominent factor ($M = 4.82$; $SD = 0.59$), followed by collaboration level ($M = 4.50$; $SD = 0.86$), communication level ($M = 3.64$; $SD = 1.21$), frustration level ($M = 3.59$; $SD = 1.49$); and difficulty level ($M = 3.09$; $SD = 1.26$). When analyzing the variables separately for each played game, further nuances were discovered, as presented in Table 3.

Table 3: Self-Perceived collaboration, communication, difficulty, frustration, and fun levels experienced while playing each game ($N = 113$)

Game	Magic Maze		Hanabi		The Mind		Rail Pass		Team 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Collaboration Level	4.23	1.03	4.38	1.02	4.39	0.84	4.80	0.42	4.92	0.28
Communication Level	3.58	0.81	3.83	1.14	2.70	1.43	4.10	0.57	4.16	1.18
Difficulty Level	3.04	1.12	2.72	1.10	3.70	1.85	2.70	1.06	3.16	0.80
Frustration Level	4.38	0.80	3.55	1.57	3.78	1.62	3.00	1.49	2.72	1.40
Fun Level	4.69	0.97	4.79	0.49	4.91	0.29	4.60	0.70	5.00	0.00

According to Table 3, the level of fun was the most prominent for every game except for Rail Pass ($M = 4.80$; $SD = 0.42$), in which collaboration was the highest-rated aspect of the experience. Team3 was classified as the game in which collaboration was deemed crucial ($M = 4.92$; $SD = 0.28$), and also as the most challenging one ($M = 3.70$; $SD = 1.85$). Frustration was reported most frequently after playing Magic Maze ($M = 4.38$; $SD = 0.80$).

Table 4: Pearson correlations among self-perceived collaboration, communication, difficulty, frustration, and fun levels ($N = 113$)

Variables	Communication Level	Difficulty Level	Frustration Level	Fun Level
Collaboration Level	$r = .34$; $p = .000$	$r = .05$; $p = .604$	$r = -.22$; $p = .018$	$r = .23$; $p = .013$
Communication Level	-	$r = -.07$; $p = .445$	$r = -.26$; $p = .005$	$r = .07$; $p = .447$
Difficulty Level	-	-	$r = .36$; $p = .000$	$r = -.11$; $p = .238$
Frustration Level	-	-	-	$r = -.04$; $p = .680$

By calculating a Pearson correlation between the variables, it was possible to analyze the strength and direction of the linear relationship between them (Table 4). Through this process, five statistically significant correlations were identified (setting the level of statistical significance at 0.05 or below). Collaboration level was found to have a significant and positive correlation with the level of communication ($r = .34$; $p = .000$), as well as with the level of fun ($r = .23$; $p = .013$). This indicates that as one variable increases, the other variable also tends to increase. Similarly, a significant and positive correlation was observed between the level of frustration and the level of difficulty ($r = .36$; $p = .000$). On the contrary, the level of frustration showed a significant and negative association with the level of collaboration ($r = -.222$; $p = .018$) and the level of communication ($r = -.26$; $p = .005$). This suggests that as one variable increases, the other variable tends to decrease.

5.2 Qualitative Data

For each play session with different groups, the facilitators who taught the game and supported the gameplay filled out a form sheet. Drawing inspiration from grounded theory (Charmaz, 2008), we analyzed the general notes on the play session and the answers to the players' responses to questions posed by the facilitators regarding what they enjoyed most, and least, and what they learned from playing the games.

After analyzing all the facilitator notes using ground theory based-analysis, we identified three different clusters that consistently emerged in response to questions about each play session:

- Game design (1).
- Game experience and indirect results (2).
- Player agency and direct interactions (3).

Table 5: Example of the clustering and definition of clusters (Grounded Theory)

Form question	Example of Collected notes	Example of dimensions (clusters)				
Facilitators' general notes	Engagement. Some discussions (when a player did a reckless move).	Engagement (2)	Individualism (2)	Communication (2)	Discussion (3)	Strategy (3)

Form question	Example of Collected notes	Example of dimensions (clusters)				
What did you enjoy more about the game?	The game is fun even though there is high frustration. Players want to play again.	Engagement (2)	Difficulty level (1)	Challenge (2)	Fun (2)	Stress (2)
What did you enjoy the least in the game?	Tracking. Hard to communicate. Using the red pawn was aggressive.	Communication (3)	Player Behavior (3)			
Did you learn anything by playing the game?	Collaboration, communication and patience (control frustration and be patient with teammates).	Cooperation (2)	Avoid recklessness (3)	Empathy (3)	Communication (3)	

Table 5 shows examples of how the facilitator notes were linked with generic dimensions of the play experience, with each dimension categorized into clusters (in brackets). Although the potential subjectivity of this analysis, as the type of note was based on what the facilitators considered important, it reveals patterns about the games to complement the quantitative analysis.

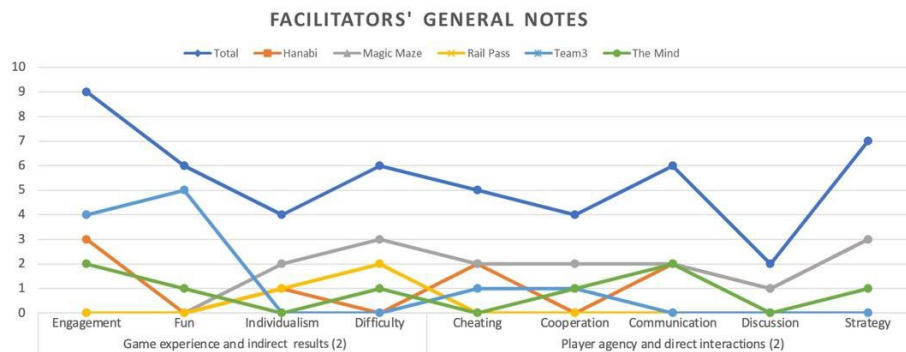


Figure 1: Quantity of dimensions (and clusters) associated with each game regarding the facilitators' general note

Figure 1 highlights the modern board game dimensions of the selected games. The strategic dimensions were highly prominent, and the engagement dimensions also received high ratings. Students expressed liking playing the games in this context and displayed motivation throughout the sessions. Team3 appeared to have the most significant impact on players, followed by Hanabi. Magic Maze and Rail Pass were perceived as the most challenging games, which is coherent with the higher level of complexity according to BGG (Table 1).

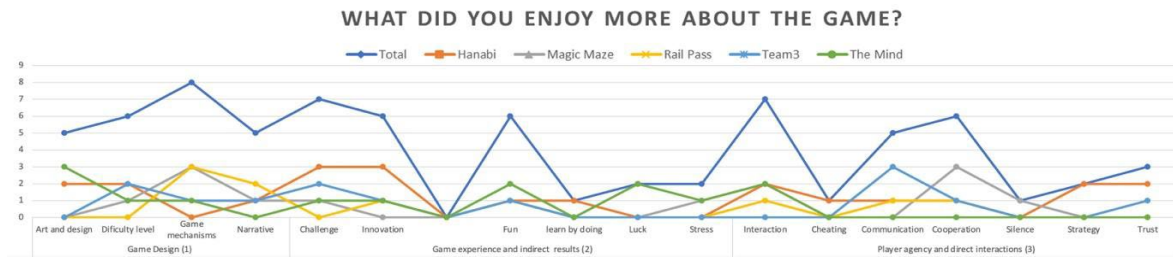


Figure 2: Quantity of dimensions (and clusters) associated with each game regarding the question: "What did you enjoy more about the game?"

Magic Maze, the most challenging game (Figure 2), exhibited higher levels of cooperation dimensions. Team3, which necessitated alternative forms of communication, showed greater communication dimensions in the responses. Fun dimensions were observed across all games despite The Mind having more reactions. Players emphasized Hanabi as having more challenging dimensions, which contrasts with the facilitators' notes that associated these dimensions more with Magic Maze. Rail Pass and Magic Maze are games that try to simulate a theme, whereas the others are more abstract. Players perceived these two previous games as having more intriguing game mechanisms. It suggests that there is a relationship between complexity, challenge, and simulation.

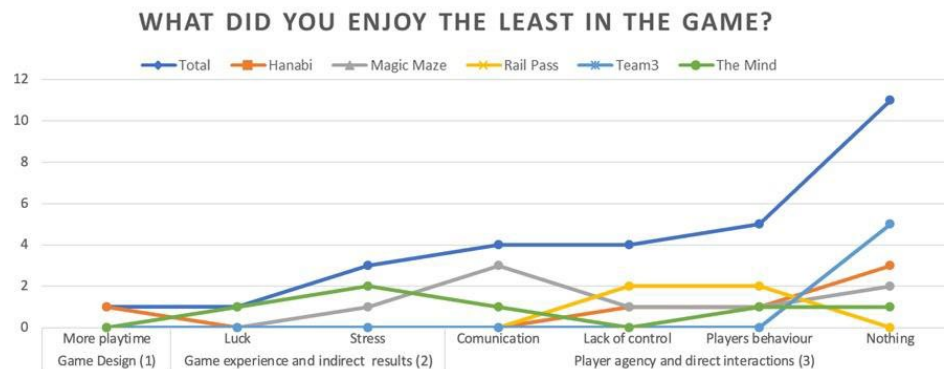


Figure 3: Quantity of dimensions (and clusters) associated with each game regarding the question: "What did you enjoy the least more about the game?"

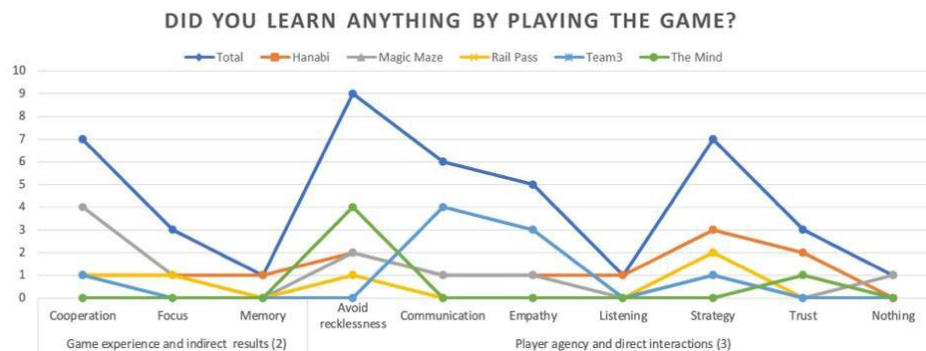


Figure 4: Quantity of dimensions (and clusters) associated with each game regarding the question: "Did you learn anything by playing the game?"

The players' perceptions associated with what they liked the most (Figure 2) and what they learned during the game (Figure 3) align with communication in Team3, strategy in Hanabi and cooperation in Magic Maze. The high mention of avoiding recklessness in The Mind can be attributed to one of the game's challenges and player actions: knowing when to play your cards.

We would like to highlight a comment from Hanabi session 3, where the facilitator wrote: "Finding ways to cheat leads us to cooperate and communicate in a fun and complex ways". The facilitators' notes revealed five associations with cheating (Figure 1). It appears that the game rules, particularly when they restrict communication, lead to cheating, which adds humour and fun to the experience. The players' responses about

what they enjoyed most (Figure 2) indicate high levels of fun statements and challenges, which are related to interaction, cooperation, and communication.

The limitation of communication and stress is apparent in the responses indicating what players enjoyed less (Figure 3). In response to the final question regarding what players learned from playing the game, several dimensions emerged, including the significance of empathy, trust, and avoiding recklessness. The findings underscored the importance of establishing effective communication and cooperation to overcome the game's challenge (Figure 4).

6. A Framework to use Games That Generate Learning About Collaboration

The case study enabled us to develop a framework for teachers, educators and trainers who intend to incorporate board games (and games in general) into learning activities that promote collaboration among students and help them identify the necessary requirements for effective collaboration. These generic requirements draw inspiration from Habermas' communicative rationality theory, which is applied to game rules and structures that require player agency and guide players towards predefined experiences in order to promote communicative rationality (Niemi, 2005; Rienstra and Hook, 2006). Although communicative rationality does not consider the playful dimensions, in the case of board games, the generative dimension of rules transforms restrictions (rules) into new ways of expression (Calleja, 2022). Through game mechanics, players follow pre-established rules. Game mechanics frame players' agency, transforming inputs into outputs, and generating feedback and new game results. The games must not only allow players to make decisions but also provide a framework for efficient communication, equality of power, shared goals and building trust that leads to collaboration experiences. To apply these concepts to game selection and address collaboration in a specific context, we propose the following process (Figure 5).

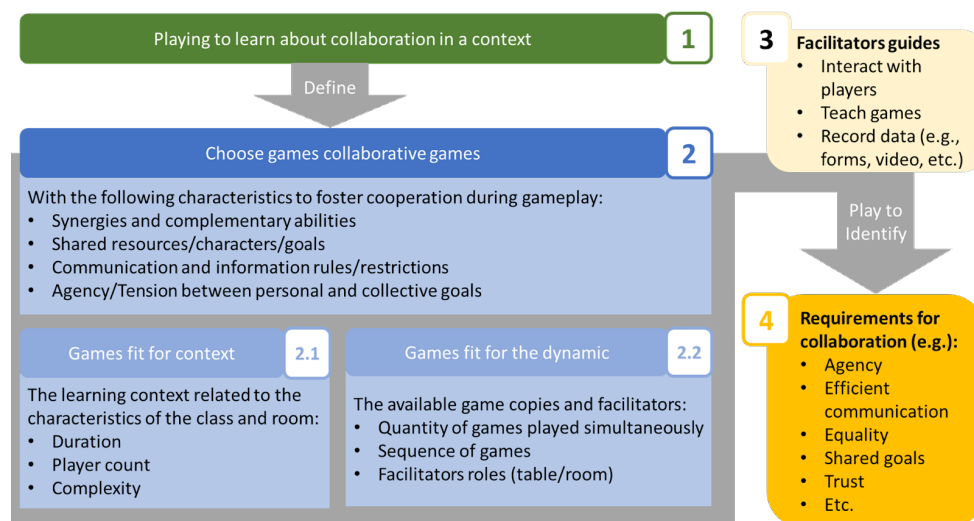


Figure 5: Process to select games and game features that lead to learning about collaboration

The process illustrated in Figure 5 requires agents (e.g., teachers) to define the context to address collaboration (1). In the case study, it was an initiative in a school that took place over the course of an entire day, but it could have been a class or sequence of classes on different days. After defining this, the agent determines which games to use that must have specific characteristics to generate collaborative experiences (2). The game choices must take into account other practical information like the available time, number of participants, the room and how many facilitators are available to support the game (or games). The play requires player agency, but only when the players know how to play. This tutorial part is the facilitator's role (the same as the agent or not). The facilitator must define a way to record data to evaluate if the players achieved the goals. In this case, it involves assessing whether the players had collaborative experiences because the game might fail due to the uncertain nature of games and player behaviour (Costikyan, 2013). This process is comparable to a serious game where the purpose is to learn about collaboration.

Our proposal departs from having games to choose from, instead focusing on designing new games. The newly designed games must incorporate collaborative characteristics (2). However, the gameplay itself involves a playtest process that requires continuous play until the game development finishes (Schell, 2008). Once the game is finalized, it can be used in a context to learn about collaboration.

7. Conclusion

In conclusion, this study provides valuable insights into the potential of modern cooperative board games as a tool for developing soft skills in high school students, with a particular emphasis on collaboration. The research findings indicate that the chosen games, namely Team3, The Mind, Rail Pass, and Magic Maze, were effective in enhancing students' collaboration, communication, and problem-solving skills. Moreover, these games were found to be engaging and enjoyable for the students. The results suggest that incorporating these games as engaging activities in the classroom could enhance students with soft skills.

The quantitative data analysis indicated that the fun level and collaboration level were the most prominent aspects of the play experience. Increasing cooperation is associated with increasing collaboration, while communication level and frustration level received lower scores. Additionally, the qualitative analysis revealed that the game design, game experience, and player agency were the three clusters consistently observed in all questions regarding each play session.

The facilitators' notes complemented the quantitative analysis and revealed patterns regarding the games, including the relationship between complexity, challenge, and simulation. The players' perceptions aligned with what they liked the most and what they learned during the game matched for communication in Team3, strategy in Hanabi, and cooperation in Magic Maze.

Cheating emerged as a noteworthy topic, leading to humour and fun, especially when the game's rules limited communication. The study has demonstrated the substantial impact of modern board games have a significant impact on players, fostering empathy, communication, cooperation, and strategy.

Furthermore, the present study contributes to the growing body of research on analogue game-based learning in education and highlights the potential of modern cooperative board games as a pedagogical tool. By providing evidence of the benefits of using such games in the classroom, this study encourages educators to consider incorporating them into the teaching practice. However, we did not test using only one game (with several copies) simultaneously played by all students during a class and facilitated by a single teacher. This approach would typically be the standard way to use the games in classes. To make this feasible, the teacher would need to create support material to instruct all students in the game (e.g., video presentation, player aids, etc.). Despite the positive results, it is unlikely that teachers would use the game without a connection to the established curricular content. This limitation requires more game and curricular adaptation. Another possibility is to transform the play session into parallel school activities, such as board game clubs located in school libraries or other social interaction spaces within the school. In such settings, a facilitator could provide support for game usage. Future research and experimentation could examine the outcomes of implementing these solutions.

Overall, this study aimed to achieve a better understanding of the potential of modern cooperative board games as engaging activities for learning and training. The results strongly suggest that these games have significant potential in enhancing students' soft skills. Future research could further investigate the long-term impact of introducing modern cooperative board games in the classroom, particularly with diverse and larger samples, focusing on the development of soft skills. Conducting a longitudinal study would be valuable to assess the effects of playing these games over a more extended period and to determine whether the skills learned during gameplay are applicable to real-world situations.

Acknowledgments

This study was funded by national funds through the FCT - Foundation for Science and Technology, I.P., under project GameIN (2022.07939.PTDC). The authors would also like to acknowledge the support of TEGA project (2020-1-UK01-KA203-079248) and Agrupamento de Escolas D. Dinis, Lisboa (AEDD).

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